CLAIMS:

1. A communication network including a first communication path having a plurality of switching routers, a second communication path having at least one communication path element different from said first communication path and extending from a selected one of said switching routers to a position on said first communication path located at a distance from said selected switching router of less than the length of said first communication path, wherein said selected switching router includes output means for outputting data with a label for routing data along one of said first and second communication paths, and routing means responsive to a fault in the transmission capability of said first communication path between said selected switching router and said position for routing data received by said selected switching router for transmission along said first communication path, along said second communication path.

2. A communication network as claimed in claim 1, wherein said first communication path includes a first switching router, a second switching router downstream of said first switching router, and a third switching router downstream of said second switching router, and said selected switching router comprises said second switching router.

3. A communication network as claimed in claim 2, wherein said second switching router includes enabling means for enabling said routing means to output data specified for transmission on said first communication path, onto said second communication path with a label for routing said data along said second communication path.

4. A communication network as claimed in claim 3, wherein said enabling means comprises a machine readable instruction.

5. A communication network as claimed in claim 4, wherein said second switching router comprises a memory storing said machine readable instruction.

6. A communication network as claimed in claim 3, wherein said second switching router is configured to read a label associated with received data and to identify therefrom data specified for transmission on said first communication path.

7. A communication network as claimed in claim 2, wherein said second switching router further comprises label switched path establishing means for establishing a label switched path on said second communication path for carrying data specified for transmission on said first communication path.

8. A communication network as claimed in claim 7, wherein said label switched path establishing means is adapted to establish said label switched path in response to a fault in the transmission capability of said first communication path.

9. A communication network as claimed in claim 2, further comprising secondary path determining means responsive to the location of a fault on the first communication path for determining said second communication path to bypass said location.

10. A communication network as claimed in claim 9, wherein said path determining means includes selection means for selecting said second communication path from a plurality of communication paths.

11. A communication network as claimed in claim 10, wherein said selection means is adapted to select as said

second communication path, the path having the shortest data transmission time.

12. A communication network as claimed in claim 2, wherein said second switching router further comprises secondary path determining means for discovering at least one secondary path.

13. A communication network as claimed in claim 12, wherein said determining means is adapted to determine the value of a parameter defining the or each second communication path.

14. A communication network as claimed in claim 13, wherein said determining means is adapted to select a secondary path based on the determined value(s) of said parameter.

15. A communication network as claimed in claim 14, wherein said parameter is the data transmission time over the secondary path, and the selection means is adapted to select as said second communication path, the path having the shortest data transmission time.

16. A communication network as claimed in claim 12, wherein said second switching router further includes signalling means for signalling said first switching router if said second switching router fails to determine a second communication path.

17. A communication network as claimed in claim 16, wherein said first switching router is adapted to determine an alternative path which bypasses said location in response to said signal.

18. A communication network as claimed in claim 17, wherein said first switching router is adapted to establish a second label switched path over said alternative path and

direct data specified for transmission on said first communication path onto said second label switched path.

19. A communication network as claimed in claim 2, wherein said first communication path includes a plurality of intermediate switching routers between said first switching router and said third switching router, a first label switched path is established on said first communication path which originates at said first switching router and terminates at said third switching router, and wherein said second switching router is selected from said plurality of intermediate switching routers as the switching router such that the difference in the transmission time on each section of the first communication path between itself and the first switching router and itself and the third switching router is a minimum.

20. A communication network as claimed in claim 2 comprising a plurality of intermediate switching routers between said first and third switching routers, a first label switched path established on said first communication path which originates at said first switching router and terminates at said third switching router, said intermediate switching routers including a plurality of said selected switching routers, each having a second communication path extending therefrom to a position on said first communication path located at a distance from a respective selected switching router of less than the length of said first communication path, and wherein the selected switching routers are selected from said plurality of intermediate switching routers such that any difference in the data transmission time on each section of the first communication path between each pair of neighbouring selected switching routers is a minimum.

21. A communication network as claimed in claim 1, wherein said second communication path is selected to share the

minimum number of communication links with said first communication path.

22. A communication network as claimed in claim 17, wherein said second communication path is selected to share the minimum number of switching routers with said first communication path.

23. A communication network as claimed in claim 2, comprising a plurality of intermediate switching routers between said first switching router and said third switching router, each being connected to said second communication path by a respective intermediate communication path, and wherein said selected switching router is that which is connected to said second communication path by the intermediate communication path having the shortest data transmission time.

24. A communication network as claimed in claim 2, further comprising a fault detector for detecting a fault on the first communication path and transmitting a signal indicating the presence of said fault to said second switching router.

25. A communication network as claimed as claimed in claim 24, wherein said fault detector further includes means for detecting the location of said fault and transmitting a signal to at least one of said first and second switching routers indicating at least one of the location of said fault and the element of said first communication path at which said fault is located.

26. A communication network as claimed in claim 2, wherein said second switching router includes enabling means for enabling said routing means to output data specified for transmission on said first communication path, onto said first

communication path with a label for routing said data along said first communication path.

27. A communication network as claimed in claim 2, comprising a label switched path on said first communication path which originates at said first switching router and terminates at said third switching router, and wherein the length of said label switched path defines the length of said first communication path.

28. A communication network as claimed in claim 2, comprising an intermediate switching router between said second switching router and said third switching router, said second communication path adjoining said first communication path at said intermediate switching router, and wherein said intermediate switching router includes enabling means for enabling said intermediate switching router to direct data received on said second communication path intended for transmission on said first communication path onto said first communication path.

29. A communication network as claimed in claim 28, comprising a label switched path established on said first communication path, and wherein said intermediate switching router is adapted to label data received from said second communication path intended for transmission on said first communication path with a label defining said label switched path on said first communication path.

30. A communication network as claimed in claim 1, wherein said first communication path includes a first switching router, a second switching router downstream of said first switching router and a third switching router downstream of said second switching router, and wherein said a second communication path extends from said second switching router to a predetermined point on said first communication path

downstream of said second switching router, said second switching router being adapted to route data over said first communication path in response to a predetermined label associated with said data, and having re-routing means responsive to a fault condition in the transmission capability of said first communication path between said second switching router and said predetermined point for re-routing data received by said second switching router from said first switching router along said second communication path.

31. A communication network as claimed in claim 30, wherein said second communication path includes a switching router between said second switching router and said predetermined point, and said switching router of said second communication path is adapted to route data received by said second switching router intended for further transmission along said first communication path to said third switching router, along said second communication path in response to a predetermined label associated with said data.

32. A communication network as claimed in claim 30, wherein said first communication path includes a further switching router between said second switching router and said third switching router, and wherein said second communication path joins said first communication path at said further switching router or downstream of said further switching router.

33. A communication network as claimed in claim 32, further comprising a third communication path between said further switching router and a second predetermined point along said first communication path downstream of said further switching router, and wherein said further switching router includes re-routing means responsive to a fault condition in the data transmission capability of the first communication

path between said further switching router and second predetermined point for re-routing data received by said further switching router intended for further transmission along said first communication path to said third switching router, along said third communication path.

34. A communication network as claimed in claim 33, wherein said third communication path includes a switching router between said further switching router and said second predetermined point, and wherein said switching router of said third communication path is adapted to route data along said path in response to a label associated with the data transmitted from said further switching router.

35. A communication network as claimed in claim 30, including a further communication path extending from said first switching router and adjoining said first communication path at a predetermined point downstream of said first switching router, wherein said first switching router includes re-routing means responsive to a fault condition in the transmission capability of said first communication path between said first switching router and said predetermined point at which said further communication path joins said first communication path, for re-routing data intended for transmission along said first communication path, along said further communication path.

36. A communication network as claimed in claim 35, wherein said further communication path includes a switching router between said first switching router and said predetermined point, said switching router being adapted to direct data from received from said first switching router intended for transmission along said first communication path along said further communication path in response to a label communicated with said data by said first switching router.

37. A communication network as claimed in claim 30, wherein said first communication path includes a first switching router, a second switching router downstream of said first switching router and a third switching router downstream of said second switching router, a second communication path extending from said first switching router to said second switching router, said second switching router being adapted to route data over said first communication path in response to a predetermined label associated with said data, and wherein said first switching router includes routing means responsive to a fault condition in the data transmission capability of said first communication path between said first switching router and said second switching router for re-routing data intended for transmission along said first communication path, along said second communication path.

38. A communication network as claimed in claim 37, wherein said second switching router is adapted to route data intended for transmission along said first communication path between said first switching router and said second switching router and received from said second communication path, along said first communication path, downstream thereof.

39. A method of conditioning a communication network to restore data transmission from a source node to a destination node in the event of a fault between an intermediate node and said destination node on a first communication path which includes said source node, said intermediate node and said destination node and defines a first label switched path originating at said source node and terminating at said destination node, the method comprising the steps of establishing a secondary label switched path, originating at said intermediate node, along a second communication path which bypasses said fault and re-joins said first communication path, and conditioning said intermediate node to direct data from

said first label switched path to said second label switched path in response to a fault on said first communication path between said intermediate node and said destination node.

40. A method as claimed in claim 39, comprising establishing said second label switched path in response to said fault.

41. A method as claimed in claim 39, comprising establishing said label switched path in response to a signal transmitted from said source node to said intermediate node.

42. A method as claimed in claim 39, comprising a plurality of intermediate nodes between said source node and said destination node, and each connected to said second communication path by a respective intermediate communication path, and establishing said secondary label switched path to originate at the intermediate node which is selected based on the value of a parameter defining at least one of (a) each of said intermediate communication paths, and (b) each of said intermediate nodes.

43. A method as claimed in claim 42, comprising selecting said secondary label switched path to originate at the intermediate node which is connected to said second label switched path by the intermediate communication path having the shortest data transmission time.

44. A method as claimed in claim 43, further comprising determining which of said intermediate communication paths has the shortest data transmission time.

45. A method as claimed in claim 42, comprising determining the values of said parameter.

46. A method as claimed in claim 39, wherein said communication network comprises a plurality of intermediate

nodes between said source node and said destination node, a respective second communication path extending from each of said plurality of intermediate nodes, and the method further comprises selecting one of said intermediate nodes and establishing said second label switched path originating at said selected intermediate node.

47. A method as claimed in claim 46, wherein the selected intermediate node is connected to a second communication path having the shortest transmission time.

48. A method as claimed in claim 46, comprising selecting said intermediate node based on the location of a fault on the first communication path.

49. A method of transmitting data specified for transmission on a first communication path between a source node and a destination node in response to a fault on said first communication path, comprising

labelling said data with a label associated with a second communication path which adjoins said first communication path at first and second locations and which bypasses said fault, the distance between said first and second locations being less than the length of said first communication path, and

outputting said labelled data onto said second communication path.

50. A method as claimed in claim 49, further comprising establishing a label switched path on said second communication path and wherein said label comprises a forwarding label of said label switched path.

51. A method as claimed in claim 49, wherein said first location is situated between said source node and said destination node.

52. A method as claimed in claim 50, comprising an intermediate node at said first location, and establishing a label switched path on said second communication path originating at said intermediate node.

53. A method as claimed in claim 50, wherein said second location is situated between said source node and said destination node.

54. A method as claimed in claim 53 comprising an intermediate node at said second location, and directing data intended for transmission on said first communication path and received from said second communication path onto said first communication path at the intermediate switching router at said second location.

55. A method as claimed in claim 54, wherein a first label switched path is established on said first communication path, and said method further comprises labelling said data with a label defining said first label switched path at said intermediate switching router.

56. A method of evaluating a node for re-directing data from a first communication path, having a source node and a destination node, along a second communication path, along a second communication path, comprising the steps of:

selecting a test node on said first communication path between said source node and said destination node and said destination node,

selecting a test node on said second communication path,

determining the value of a parameter of a test path between said test nodes, and evaluating the test node on said first path for re-directing data to said second path based on the determined value of said parameter.

57. A method as claimed in claim 56, further comprising selecting a plurality of test nodes on said first communication path between said source node and said destination node, determining the value of a parameter of a test path from each of said plurality of test nodes on said first communication path to said test node on said second communication path, and selecting one of said plurality of test nodes on said first communication path for redirecting data to said second path based on the values of said parameters.

58. A method as claimed in claim 57, further comprising extending each test path from each of said plurality of test nodes to an imaginary node by a respective imaginary path, and for each of said plurality of test nodes on said first communication path, determining the value of a parameter of said test path from said imaginary node to the test node on said second path, and selecting a node from said plurality of test nodes on said first communication path based on the values of said parameters.

59. A method as claimed in claim 58, further comprising setting equal values of said parameter for each of said imaginary paths.

60. A method as claimed in claim 58, further comprising setting the value of said parameter for each of said portions of said first communication path between adjacent said test nodes on said first communication path at a value which excludes the or each portion from each test path.

61. A method as claimed in claim 57, further comprising selecting a plurality of test nodes on said second communication path and determining the value of a parameter of a test path between each of said plurality of test nodes on said first communication path and each of said plurality of test nodes on said second communication path, and selecting a node for re-directing data to said second communication path from said plurality of test nodes on said first communication path based on the determined values of said parameter.

62. A method as claimed in claim 61, further comprising extending each of said test paths from each of said test nodes on said second communication path to an imaginary node by a respective imaginary path, and for each of said plurality of test nodes on said second communication path, calculating the value of a parameter of the test path from said imaginary node to each of the test nodes on said first communication path, and selecting a node for directing data to said second communication path from said plurality of test nodes on said first communication path based on the values of said parameter.

63. A method as claimed in claim 62, further comprising step of setting substantially equally values of said parameter for each of said imaginary paths.

64. A method as claimed in claim 62, further comprising setting a value of said parameter for the portion of said second path between each adjacent test node on said second communication path such that the or each portion of said second communication path is excluded from each test path.

65. A method as claimed in claim 61, wherein the step of selecting a plurality of test nodes on said second communication path, comprises selecting a plurality of test nodes connected to three or more communication links.

66. A method as claimed in claim 56, wherein said parameter is selected from the group consisting of (a) path length, (b) path cost, (c) path capacity, (d) density of data on the path, (e) the number of nodes on the path and (f) the number of nodes on the path having three or more communication links.

67. A method as claimed in claim 57, further comprising selecting a node for re-directing data to said second communication path from said plurality of test nodes if a test path excludes all nodes on said first communication path other than said plurality of test nodes.

68. A method as claimed in claim 57, comprising selecting a node for re-directing data to said second communication path from one of said source node and one or more other nodes, if any between said source node and the first of said plurality of test nodes on said first communication path if each of said test paths include said source node or one or more of said other nodes or said destination node.

69. A method as claimed in claim 68, comprising selecting said source node as said node for re-directing data to said second communication path if each of said test paths includes said source node or said destination node.

70. A method as claimed in claim 57, further comprising the step of selecting a second communication path from a plurality of communication paths connected to said destination node, such that the selected second communication path shares the minimum number of communication links with the first communication path.

71. A method as claimed in claim 70, comprising selecting said second communication path such that said second communication path shares the minimum number of nodes with said

first communication path between said test node on said communication path and said destination and said destination node.

72. A communication network comprising a first communication path having a source node and a destination node and a plurality of intermediate nodes therebetween, a second communication path connected to said destination node, and wherein an intermediate node on said first communication path includes re-routing means for re-routing data intended for continued transmission on said first communication path along said second communication path, said intermediate node being selected from a plurality of said intermediate nodes according to the method as claimed in claim 57.

73. A method of selecting an alternative path for carrying data intended for transmission along a communication path between the source node and a destination node, comprising selecting a plurality of alternate paths connected between an intermediate node of said communication path and said destination node, and selecting from said plurality of alternate paths, the path which shares the minimum number of links with said communication path between said intermediate node and said destination node.

74. A method as claimed in claim 73, further comprising selecting from said plurality of alternate paths, the path sharing the minimum number of intermediate nodes with said communication path between said intermediate node and said destination node.